

# NATIONAL BUREAU OF STANDARDS REPORT

## NBS PROJECT

0201-30-2303

0201-30-2328

## NBS REPORT

March 31, 1954

3185

### IMPROVEMENT OF VISUAL AIDS FOR AIR NAVIGATION

Progress Report  
July 1, 1953 to February 28, 1954

Prepared by  
F. C. Breckenridge

To  
Airways Engineering Division  
Civil Aeronautics Administration



## U. S. DEPARTMENT OF COMMERCE NATIONAL BUREAU OF STANDARDS

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# IMPROVEMENT OF VISUAL AIDS FOR AIR NAVIGATION PROGRESS REPORT

## 1. OBJECTIVES

It is the purpose of this project to carry on research and testing, develop specialized equipment and provide consultation services for the Airways Engineering Division of the Office of Federal Airways, Civil Aeronautics Administration.

## 2. STATUS

At the beginning of the period covered by this report, all of the research activities and three of the tests covered by this report were in progress. At the close of the period two of the research activities were nearing completion, and there was only one uncompleted test pending. The work covered by this report is financed by two separate funds, and hence two N.B.S. project numbers appear on the title page. A separate financial summary is attached covering the charges against each of these funds.

## 3. GOVERNMENT TESTS

The tests reported in this division of the report were made by personnel other than those regularly assigned to the C.A.A. projects. With one exception they are standard tests which could be covered by simple reports. A brief summary of these tests follows:

<u>Test No.</u>	<u>Requested</u>	<u>Reported</u>	<u>Estimate</u>	<u>Cost</u>
GL3593	6-18-53	7-21-53	\$100.	\$100.

A fuel oil additive carrying the trade name "GO-Sludge" was analyzed and found to be essentially a mixture of soluble oil of petroleum origin and alcohols. As the result of this analysis it was agreed that it would not be worth the expense to test the material further.

GL3887      Test Canceled

This number was assigned to a propeller test which was canceled after preliminary conferences because there were no funds available to cover the work.

GL4096	9-11-53	10-6-53	\$200/\$400*	\$386.
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A field intensity meter was submitted for calibration at 118 megacycles. Later, it was decided that the meter should be calibrated at 109 and 333 megacycles also. Still later, it was requested that the meter be calibrated at 30 megacycles which required special arrangements. Difficulty was experienced in checking the linearity of the meter, but a satisfactory calibration was finally obtained.

\*Increased to cover additional work.



# IMPROVEMENT OF VISUAL AIDS FOR AIR NAVIGATION PROGRAM SUMMARY

## 1. OBJECTIVES

It is the purpose of this project to carry on research and testing, develop specialized equipment and provide consultation services for the Airway Engineering Division of the Office of Federal Airways, Civil Aeronautics Administration.

## 2. STATUS

At the beginning of the period covered by this report, all of the research activities and three of the tests covered by this report were in progress. At the close of the period two of the research activities were nearing completion, and there was only one uncompleted test pending. The work covered by this report is financed by two separate funds, and hence two R.A.S. project numbers appear on the title page. A separate financial summary is attached covering the charges against each of these funds.

## 3. EXPERIMENTAL TESTS

The tests reported in this division of the report were made by personnel other than those regularly assigned to the C.A.A. projects. With one exception they are standard tests which could be covered by existing reports. A brief summary of these tests follows:

Test No.	Requested	Reported	Estimated	Cost
AL3553	6-18-53	7-21-53	\$100.	\$100.

A fuel oil additive carrying the trade name "60-21-40" was analyzed and found to be essentially a mixture of kerosene oil of petroleum origin and alcohol. As the result of this analysis it was agreed that it would not be worth the expense to test the material further.

AL3557 Test Cancelled

This number was assigned to a propeller test which was cancelled after preliminary conferences because there were no funds available to cover the work.

AL4055	9-11-53	10-6-53	\$200/\$400*	\$386.
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A field intensity meter was submitted for calibration at 118 megacycles. Later, it was decided that the meter should be calibrated at 109 and 333 megacycles also. Still later, it was requested that the meter be calibrated at 30 megacycles which required special arrangements. Difficulty was experienced in checking the linearity of the meter, but a satisfactory calibration was finally obtained.

\*Requested to cover additional work.



<u>Test No.</u>	<u>Requested</u>	<u>Reported</u>	<u>Estimate</u>	<u>Cost</u>
014807	1-6-54	2-1-54 & 3-2-54	--	--

Nineteen parts from a PAR 56 lamp holder were examined spectrochemically to determine if they complied with C.A.A. specifications. Some of the parts did not comply, notably the principal casting. Additional tests were made on successive samples until satisfactory parts were tested.

\* Charged to a separate account but included because no separate report will be made for that account.

014868	1-6-54	1-29-54	\$100.	\$29.
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A connector assembly for a PAR 56 lamp holder was tested to determine if it could withstand the required voltages. The results were satisfactory.

014950	1-15-54	2-12-54	\$50.	\$64.
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A radio-frequency cavity meter was calibrated at six frequencies and the meter setting at resonance was recorded and reported.

014952	1-27-54	2-25-54	--	--
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A cable clamp was tested by spectrochemical analysis to determine if it conformed with the requirements of the specification. The clamp was in three parts, two of which met the requirements completely but the third part was considerably low in magnesium.

\* Charged to a separate account but included because no separate report will be made for that account.

#### 4. PROJECT TESTS

In general the project tests were carried out within the Division to which the C.A.A. projects have been assigned. They frequently involve unusual aspects which place them outside the category of standard tests.

<u>Test No.</u>	<u>Requested</u>	<u>Reported</u>	<u>Estimate</u>	<u>Cost</u>
22-1/54	12-24-53	1-22-54	\$300.	\$155.

One pair of binoculars of Japanese manufacture were tested for compliance with C.A.A. specifications. The free aperture of the right barrel was 2% below the specified value and the resolution in both barrels was somewhat outside the specification limit. The binoculars, however, appeared to be satisfactory for ordinary use.



1



<u>Test No.</u>	<u>Requested</u>	<u>Reported</u>	<u>Estimate</u>	<u>Cost</u>
21A-5/53	4-3-53	8-6-53	\$175.	fy 53 - \$114. fy 54 - \$115.

This test, which was carried over from the previous year, covers three lots of neon approach-light lamps. The first two lots were unsatisfactory for operating voltage and the third lot was considerably below the specified limit for light output.

21A-8/53	5-14-53	8-17-53	\$175.	\$165.
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Three sample transformers for approach-light units were tested for compliance with the requirements of the C.A.A. specification. The inspection revealed five deficiencies with respect to the specifications, but only one of these, a low power-factor, was considered serious.

21A-10/53	11-3-53	(in progress)	\$175.	\$810.
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Fifteen approach-light photometers were inspected and calibrated. These instruments were found to have incorrect test-plate orifices which had to be returned to the manufacturer for enlargement. Upon being returned they were reinstalled in the instruments before calibration could be made. Some difficulties were also experienced in checking additional photometers which were returned to this bureau from the C.A.A. and the National Airport. In one case a new calibration lamp had to be installed in the calibrator. After these difficulties had been overcome the tests proceeded satisfactorily. The units were calibrated, calibration cards were prepared, the cards were sealed into plastic covers and installed in the instrument cases and the instruments were packed and shipped on bills of lading furnished by the C.A.A.

213-6-54	1-6-54	2-7-54	—	\$270.
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Two transformers designed for direct earth burial were tested for compliance with the requirements of the C.A.A. specification. One was taken apart and inspected for construction and found satisfactory. The other transformer was tested for electrical characteristics before and after being dropped to simulate the effects of rough handling. All previous tests were then repeated. The transformers were found to be in accordance with specifications.

In the previous fiscal year an experimental traffic signal projector was available for simultaneous distribution measurements. After using this instrument, it was found that the device could be improved by replacing the lamp to make a more satisfactory use of the filament area. This modification of this work was discussed with the C.A.A.

\* Costs stated are for the report period.



10-12-50 10-12-50 10-12-50 10-12-50 10-12-50  
10-12-50 10-12-50 10-12-50 10-12-50 10-12-50

This report, which was prepared by the Bureau of the Census, shows that the number of persons in the United States who are employed in the service of the Government has increased from 1,000,000 in 1940 to 1,500,000 in 1950.

The increase in the number of persons employed in the service of the Government is due to the fact that the Government has been expanding its activities in many fields, such as the development of new industries, the improvement of the public health, and the maintenance of the national defense.

It is estimated that the number of persons employed in the service of the Government will continue to increase in the future, as the Government continues to expand its activities in many fields. This increase will be due to the fact that the Government has been expanding its activities in many fields, such as the development of new industries, the improvement of the public health, and the maintenance of the national defense.

The increase in the number of persons employed in the service of the Government is due to the fact that the Government has been expanding its activities in many fields, such as the development of new industries, the improvement of the public health, and the maintenance of the national defense.

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## 5. RESEARCH, CONSULTATION AND LIAISON SERVICES

### 5.1 Study of exposure characteristics of metal protective paints

This study embraces the characteristics of 18 coating sequences applied to corroded steel panels, used to simulate old structures, and 10 sequences applied to galvanized steel panels, simulating new work, to determine the relative corrosion protective value of the different treatments. The corroded panels were brushed to remove loose rust. The galvanized steel panels were given priming coats comprised of zinc dust and zinc oxide and two coats of orange exterior enamel followed by 2000 hours in an accelerated weathering equipment before being treated with the other coatings. Both natural and accelerated weathering is being used on the completed panels. In December, a progress report was submitted covering the loss of gloss and color changes for the different specimens. At the time the progress report was prepared only one of the coating systems had proven inferior to the others in protective value, although there was considerable difference in the loss of gloss. Up to that time, the study had not revealed a satisfactory correlation between the results obtained from the outdoor exposures and those resulting from the use of the accelerated weathering equipment. The test is being continued.

Cost: \$680. \*

### 5.2 Study of green plastic for beacon covers

During the previous year, various samples of green plastic were tested for chromaticity until a satisfactory sample was found. On the basis of this sample, some experimental green plastic covers for 2 1/2" beacons were purchased by the C.A.A. and one of these was sent to this Bureau. In order to obtain information on the exposure characteristics to be expected from this plastic, a 2" disc was cut from the center of this cover and the resulting hole was filled with a piece of clear plastic. This beacon cover was returned to the C.A.A. for service tests and the small sample was spectrophotometered to determine its chromaticity. Subsequently, this disc was given four 120-hour exposures to spray and ultra-violet radiation. After each exposure the sample was again spectrophotometered and its chromaticity has been computed for each stage. The results appear very stable but the report has not as yet been prepared.

Cost: \$115.

### 5.3 Study of optical system for traffic control projectors

In the previous fiscal year an experimental traffic signal projector was submitted for candlepower distribution measurements. After making these measurements, it was found that the device could be improved by rotating the lamp to make a more satisfactory use of the filament form. Upon completion of this work the results were discussed with the C.A.A.

\* Costs stated are for the report period.







engineers and it has decided to make a more thorough study of the possibilities of improving the optical system and measurements were made on a electric lamp which had been obtained from Eastern Kodak Co. The results of the distribution obtained was so satisfactory that an additional lamp of the same type was obtained, but this lamp taken from one production did not give equally good results. When this fact was brought to the attention of the Eastern Kodak Co., they voluntarily donated two additional samples of both old and new production and these were also tested with results confirming those previously obtained. This study has also included tests on the variations to be expected in manufacturing one lamp for another in the original experimental projector. A report of the work has been submitted and further study is being ordered with the Eastern Kodak Co. has been informed of the latest results and policy decisions can be made by them and the Street Engineering Division.

Cost: \$110.

#### 5.4 Standard for signal-light colors

During the previous fiscal year a first draft of a joint specification to cover the requirements of civil and military agencies for standard of controlling the color of aviation ground lights was prepared and submitted to the Lighting and Marking Board. After considering the draft and a report on the status of the relationship between this proposed specification and the specification for aircraft lighting colors, the Board reported that the draft be revised for the purpose of including the aircraft lighting requirements. The draft was submitted to Mr. A. C. Fisher of the Bureau of Aeronautics at his facilities with the requirement for signal colors for military aircraft and communications constants have been received from Mr. Fisher. The preliminary portions of the first section of this standard have now been revised and the work on the basic chromatically definitions and colorimetric necessary for illustrating them is going forward. This work is being handled as a joint project with the Bureau of Aeronautics, the major part of the expense being covered by that Bureau.

Cost: \$250.

#### 5.5 Publications and library activities

This item includes correspondence, conferences, administrative reports and other general activities incident to the conduct of this project.

Cost: \$115.







Financial Summary, July 1, 1953 to February 26, 1954

C.A.A. Fund No. 121330.001

H.S.S. Project 0201-30-2326

Transfer by C.A.A. Order CA-54-274

\$8000.

Cost of tests performed

H.S.S. No.      Date of request      Item Tested \*      Costs to date

"Government Tests"

013593	6-18-53	"Go-Sludge"	\$ 100
013887	7	Propeller	Cancelled
014096	9-11-53	Field Intensity Meter	306
014807	1-6-54	Lamp holders for approach lights	— 00
014868	1-6-54	PAN Lamp connectors	29 00
014950	1-15-54	Frequency meter	64
014952	1-27-54	Cable clamp	— 00

"Project Tests"

22-1-54	12-24-53	Binooculars	155
21A-5/53	4-3-53	Beacon lamps for approach lights	115
21A-3/53	5-14-53	Transformers for approach lights	465
21A-10/53	11-3-53	Approach-light photometers (Report pending)	810
Total for tests			\$ 2154

Research, Consultation and Liaison Services

Study of exposure characteristics of metal protective paints	680
Study of green plastic for beacon covers	115
Study of optical system for traffic control projectors	1390
Standardization of specifications for signal colors	180
Consultation and Liaison	1855

Total      \$ 4220

Total Expended      6374.

Balance Available 3-1-54      \$1626.

\* For scope of test see previous section of report.  
\*\* Separate funds.







Financial Summary, July 1, 1953 to February 28, 1954  
C.I.A. Fund No. 1301305.001

H.B.S. Projects 0201-30-2303  
and 37-8

Carry over from fiscal year 1953 (CA53-733 Amendment 2) \$2995.37  
(Reduced from balance stated in last report by accruals  
of obligations of prior year in the amount of \$4.58)

Cost of Test Performed

Number	Date of request	Item Tested	Cost
RI3-6-54	1-6-54	Direct burial transformers	\$270

Research, Consultation and Liaison Services

Liaison activities	66
	<u>336</u>

Balance Available 3-1-54

\$2659.



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10-10-55

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